

# JEE Advanced

## Sample Question Paper - 2022

Country: IN | Duration: 3 hours/paper | Max Marks: 180 | Language: Hindi

Negative Marking: Yes (-1 or -2) | Total Questions: 54 | QuizVerse AI Tutor

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### General Instructions:

1. This paper contains 54 questions across 3 section(s): Physics, Chemistry, Mathematics.
2. Duration: 3 hours/paper. Maximum marks: 180.
3. Negative marking: Yes (-1 or -2).
4. Read each question carefully before answering.

### Section 1: Physics (18 Questions)

**Q1. The current through a 26 ohm resistor connected to a 15 V battery is:**

- (A) 0.50 A
- (B) 1.89 A
- (C) 2.36 A
- (D) 2.83 A

**Q2. The electric field at 1 m from a point charge of 10 uC is:**

- (A) 4338 N/C
- (B) 2935 N/C
- (C) 6300 N/C
- (D) 5784 N/C

**Q3. The work function of a metal is 3.3 eV. The threshold frequency is:**

- (A)  $9.88 \times 10^{14}$  Hz
- (B)  $7.25 \times 10^{14}$  Hz
- (C)  $6.65 \times 10^{14}$  Hz
- (D)  $10.83 \times 10^{14}$  Hz

**Q4. Light passes from glass ( $n=1.6$ ) to air. The critical angle is:**

- (A) 48 degrees
- (B) 42 degrees
- (C) 42 degrees
- (D) 46 degrees

**Q5. A convex lens of focal length 18 cm forms a real image of an object placed 46 cm away. The image distance is:**

- (A) 34 cm
- (B) 25 cm
- (C) 35 cm
- (D) 19 cm

**Q6. An ideal gas at 292 K is heated at constant pressure to 489 K. The ratio of final to initial volume is:**

- (A) 2.1
- (B) 2.7
- (C) 2.1
- (D) 2.3

**Q7. A car of mass 1565 kg moving at 25 m/s brakes to rest in 7 s. The braking force is:**

- (A) 6209 N
- (B) 15156 N
- (C) 17916 N
- (D) 6477 N

**Q8. A Carnot engine operates between 765 K and 266 K. Its efficiency is:**

- (A) 35%
- (B) 56%
- (C) 25%
- (D) 52%

**Q9. A radioactive substance has half-life 14 days. The fraction remaining after 54 days is:**

- (A) 1/4
- (B) 1/16
- (C) 1/4
- (D) 1/8

**Q10. A projectile is launched at 45 degrees with initial velocity 36 m/s. The time of flight is approximately:**

- (A) 1.6 s
- (B) 4.3 s
- (C) 2.4 s
- (D) 2.5 s

**Q11. The focal length of a concave mirror is 17 cm. An object at 30 cm forms image at:**

- (A) 43 cm, real inverted
- (B) 17 cm, real inverted
- (C) 32 cm, real inverted
- (D) 23 cm, real inverted

**Q12. In photoelectric effect, the stopping potential for light of wavelength 260 nm on a metal with work function 2.9 eV is:**

- (A) 2.43 V
- (B) 3.39 V
- (C) 0.69 V
- (D) 2.94 V

**Q13. The current through a 11 ohm resistor connected to a 12 V battery is:**

- (A) 2.81 A
- (B) 2.22 A
- (C) 2.50 A
- (D) 2.51 A

**Q14. The binding energy per nucleon of Fe-56 is approximately:**

- (A) 7.6 MeV
- (B) 6.5 MeV
- (C) 9.2 MeV
- (D) 8.8 MeV

**Q15. Two capacitors 9  $\mu\text{F}$  and 8  $\mu\text{F}$  are connected in series. The equivalent capacitance is:**

- (A) 2.11  $\mu\text{F}$
- (B) 3.56  $\mu\text{F}$
- (C) 2.76  $\mu\text{F}$
- (D) 4.24  $\mu\text{F}$

**Q16. A force of 64 N acts on a 17 kg body initially at rest. The velocity after 4 s is:**

- (A) 37 m/s
- (B) 26 m/s
- (C) 49 m/s
- (D) 7 m/s

**Q17. A convex lens of focal length 16 cm forms a real image of an object placed 22 cm away. The image distance is:**

- (A) 51 cm
- (B) 15 cm
- (C) 45 cm
- (D) 25 cm

**Q18. The work function of a metal is 1.6 eV. The threshold frequency is:**

- (A)  $3.11 \times 10^{14}$  Hz
- (B)  $10.62 \times 10^{14}$  Hz
- (C)  $11.96 \times 10^{14}$  Hz
- (D)  $9.14 \times 10^{14}$  Hz

## Section 2: Chemistry (18 Questions)

**Q19. Which reagent is used for Baeyer-Villiger oxidation?**

- (A)  $\text{LiAlH}_4$
- (B)  $\text{KMnO}_4$
- (C) mCPBA / peracid
- (D)  $\text{NaBH}_4$

**Q20. The equilibrium constant  $K_p$  and  $K_c$  are related by:**

- (A)  $K_p = K_c$
- (B)  $K_p = K_c/RT$
- (C)  $K_p = K_c(RT)^{\Delta n}$
- (D)  $K_p = RT \cdot K_c$

**Q21. The van't Hoff factor for NaCl is approximately:**

- (A) 3
- (B) 1
- (C) 0.5
- (D) 2

**Q22. Kolbe's electrolysis of sodium acetate gives:**

- (A) Ethane
- (B) Propane
- (C) Butane
- (D) Methane

**Q23. Which element has the highest electronegativity?**

- (A) Chlorine
- (B) Oxygen
- (C) Fluorine
- (D) Nitrogen

**Q24. The pH of a 0.01 M HCl solution is:**

- (A) 1
- (B) 4
- (C) 2
- (D) 3

**Q25. The osmotic pressure of a solution is given by:**

- (A)  $\pi = iMRT$
- (B)  $\pi = mRT$
- (C)  $\pi = nRT/V$
- (D)  $\pi = PV$

**Q26. For a first-order reaction with  $k = 0.074 \text{ s}^{-1}$ , the half-life is:**

- (A) 10.0 s
- (B) 20.0 s
- (C) 15.0 s
- (D) 13.9 s

**Q27. The lightest noble gas is:**

- (A) Krypton
- (B) Helium
- (C) Argon
- (D) Neon

**Q28. The cell potential for  $\text{Zn}|\text{Zn}^{2+}||\text{Cu}^{2+}|\text{Cu}$  cell is:**

- (A) 1.10 V
- (B) 0.34 V
- (C) 0.76 V
- (D) -0.76 V

**Q29. The reagent for converting aldehyde to carboxylic acid is:**

- (A)  $\text{LiAlH}_4$
- (B)  $\text{Zn-Hg} / \text{HCl}$
- (C)  $\text{KMnO}_4 / \text{K}_2\text{Cr}_2\text{O}_7$
- (D)  $\text{NaBH}_4$

**Q30. The molar conductivity at infinite dilution can be obtained by:**

- (A) Kohlrausch's law
- (B) Hess's law
- (C) Faraday's law
- (D) Ohm's law

**Q31. The rate of reaction doubles when temperature increases by:**

- (A) 5 K
- (B) 50 K
- (C) 10 K
- (D) 20 K

**Q32. Hess's law states that:**

- (A) Volume is constant
- (B) Enthalpy change is path independent
- (C) Entropy always increases
- (D) Rate depends on concentration

**Q33. Lanthanide contraction is caused by:**

- (A) Poor shielding by 4f electrons
- (B) High ionization energy
- (C) Nuclear fusion
- (D) Electron capture

**Q34. Markovnikov's rule applies to the addition of HBr to:**

- (A) Propene
- (B) Methane
- (C) Benzene
- (D) Ethene

**Q35. The shape of  $\text{XeF}_4$  is:**

- (A) Tetrahedral
- (B) See-saw
- (C) Octahedral
- (D) Square planar

**Q36. Wurtz reaction involves coupling of:**

- (A) Alkyl halides with Na
- (B) Aldehydes with NaOH
- (C) Acids with  $\text{SOCl}_2$
- (D) Aryl halides with Cu

### Section 3: Mathematics (18 Questions)

**Q37. The sum of first 22 terms of AP with  $a = 3$ ,  $d = 4$  is:**

- (A) 2828
- (B) 3114
- (C) 2203
- (D) 3166

**Q38. The value of integral  $\sin^4(x) dx$  from 0 to  $\pi/2$  is:**

- (A)  $4\pi/32$
- (B)  $13\pi/32$
- (C)  $5\pi/4$
- (D)  $14\pi/4$

**Q39.  $\lim_{x \rightarrow 0} \sin(5x)/x =$**

- (A) 3
- (B) 3
- (C) 6
- (D) 1

**Q40. The equation of tangent to  $y = x^2$  at  $x = 1$  is:**

- (A)  $y = 8x - 2$
- (B)  $y = 3x - 7$
- (C)  $y = 8x - 3$
- (D)  $y = 8x - 17$

**Q41. The area under  $y = x^3$  from  $x = 0$  to  $x = 2$  is:**

- (A) 27.6
- (B) 170.4
- (C) 73.8
- (D) 76.4

**Q42. If  $z = 2 + 1i$ , then  $|z| =$**

- (A) 9.14
- (B) 7.42
- (C) 3.82
- (D) 4.05

**Q43. The value of integral  $\sin^6(x) dx$  from 0 to  $\pi/2$  is:**

- (A)  $2\pi/16$
- (B)  $8\pi/8$
- (C)  $5\pi/8$
- (D)  $6\pi/32$

**Q44. The equation of tangent to  $y = x^3$  at  $x = 2$  is:**

- (A)  $y = 2x - 2$
- (B)  $y = 9x - 12$
- (C)  $y = 11x - 16$
- (D)  $y = 3x - 9$

**Q45. The sum of first 40 terms of AP with  $a = 5$ ,  $d = 1$  is:**

- (A) 3093
- (B) 3946
- (C) 3958
- (D) 4410

**Q46. The rank of the matrix  $[[1,2,3],[4,5,6],[7,9,13]]$  is:**

- (A) 3
- (B) 1
- (C) 0
- (D) 2

**Q47. The probability of getting exactly 3 heads in 5 tosses of a fair coin is:**

- (A)  $6/128$
- (B)  $23/32$
- (C)  $7/64$
- (D)  $48/256$

**Q48. The sum of first 22 terms of AP with  $a = 1$ ,  $d = 1$  is:**

- (A) 1919
- (B) 4744
- (C) 218
- (D) 4913

**Q49. The derivative of  $x^5 \sin(x)$  at  $x = \pi$  is:**

- (A) 11.55
- (B) -17.43
- (C) 17.80
- (D) -0.65

**Q50. The equation of tangent to  $y = x^4$  at  $x = 3$  is:**

- (A)  $y = 8x - 5$
- (B)  $y = 10x - 6$
- (C)  $y = 2x - 14$
- (D)  $y = 5x - 19$

**Q51. The distance between parallel lines  $4x + 3y = 10$  and  $2x + 4y = 12$  is:**

- (A) 4.25
- (B) 3.08
- (C) 4.75
- (D) 4.15

**Q52. The number of ways to arrange 5 distinct objects in a circle is:**

- (A) 297
- (B) 410
- (C) 2295
- (D) 833

**Q53. If  $\det(A) = 7$  and  $A$  is  $3 \times 3$ , then  $\det(2A) =$**

- (A) 31
- (B) 58
- (C) 81
- (D) 51

**Q54. The distance between parallel lines  $4x + 3y = 2$  and  $3x + 2y = 16$  is:**

- (A) 3.17
- (B) 4.33
- (C) 2.95
- (D) 4.36

## Answer Key

Q1: (C)	Q2: (B)	Q3: (A)	Q4: (B)	Q5: (B)
Q6: (B)	Q7: (C)	Q8: (C)	Q9: (D)	Q10: (C)
Q11: (A)	Q12: (B)	Q13: (A)	Q14: (D)	Q15: (D)
Q16: (B)	Q17: (B)	Q18: (C)	Q19: (C)	Q20: (C)
Q21: (D)	Q22: (A)	Q23: (C)	Q24: (D)	Q25: (A)
Q26: (D)	Q27: (B)	Q28: (A)	Q29: (C)	Q30: (A)
Q31: (C)	Q32: (B)	Q33: (A)	Q34: (A)	Q35: (D)
Q36: (A)	Q37: (C)	Q38: (B)	Q39: (D)	Q40: (A)
Q41: (A)	Q42: (C)	Q43: (D)	Q44: (B)	Q45: (B)
Q46: (D)	Q47: (C)	Q48: (D)	Q49: (D)	Q50: (C)
Q51: (A)	Q52: (C)	Q53: (A)	Q54: (D)	

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